

Commutative, Associative and Distributive Properties

Unit: Knowing Our Numbers - Student Practice Worksheet

Overview: Ms. Rao tipped a box of 240 bottle caps onto the table and told the class to count them however they liked, in under a minute. Some groups counted them one by one. One group split the pile into four smaller piles first. Every group reached exactly 240 — but only one method finished with time to spare.

Practice Questions (30 Total)

Section A - Easy

Q1. The two boxes swap the order of 7 and 9. Which statement is true?

$$\boxed{7 \times 9} = \boxed{9 \times 7}$$

- ☐ A. $7 \times 9 = 9 \times 7$
- ☐ B. $7 - 9 = 9 - 7$
- ☐ C. $7 / 9 = 9 / 7$
- ☐ D. $7 \times 9 = 7 + 9$

Q2. Which property says $a + b = b + a$?

- ☐ A. Distributive
- ☐ B. Associative
- ☐ C. Identity
- ☐ D. Commutative

Q3. Compute $6 \times 20 + 6 \times 3$.

- ☐ A. 120
- ☐ B. 26
- ☐ C. 138
- ☐ D. 123

Q4. The table and boxes show two ways to group $2+3+4$. Which property is this?

$$(2+3)+4$$

$$2+(3+4)$$

- ☐ A. Distributive
- ☐ B. Commutative
- ☐ C. Subtraction rule
- ☐ D. Associative

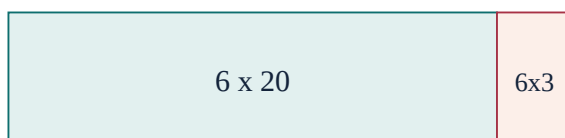
Q5. Does the commutative property work for subtraction?

- ☐ A. Yes, always
- ☐ B. No
- ☐ C. Only with even numbers
- ☐ D. Only with 0

Q6. What do both $(2+3)+4$ and $2+(3+4)$ equal?

- ☐ A. 9
- ☐ B. 5
- ☐ C. 24
- ☐ D. 7

Q7. The split rectangle shows $6 \times 23 = 6 \times 20 + 6 \times 3$. Which property is this?



6×23 split as $6 \times (20 + 3)$

- ☐ A. Commutative
- ☐ B. Associative
- ☐ C. Distributive
- ☐ D. None of these

Q8. What does the distributive property connect?

- ☐ A. Subtraction and division
- ☐ B. Only two multiplications
- ☐ C. Only two subtractions
- ☐ D. Multiplication and addition

Q9. Anaya paired $58+62$ first. What is that pair's sum?

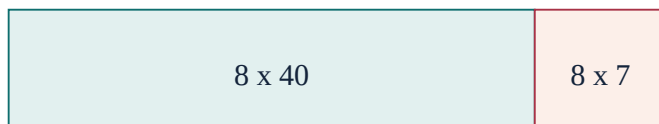
- ☐ A. 110
- ☐ B. 130
- ☐ C. 100
- ☐ D. 120

Q10. Which property lets you count a pile in any grouping you like and still get the right total?

- ☐ A. Subtraction property
- ☐ B. Associative property
- ☐ C. Distributive only
- ☐ D. Division property

Section B - Medium

Q11. Use the split rectangle to compute 8×47 .



$$8 \times 47 = 8 \times (40 + 7)$$

- ☐ A. 376
- ☐ B. 360
- ☐ C. 384
- ☐ D. 320

Q12. Which expression is equal to $9 \times (10 + 2)$?

- ☐ A. $9 \times 10 - 9 \times 2$
- ☐ B. $(9 \times 10) + (9 \times 2)$
- ☐ C. $9 \times 10 \times 2$

- ☐ D. $9 + 10 + 2$

Q13. Kabir adds $25+18+75+22$ by pairing $25+75$ and $18+22$. What totals does he get before the final add?

- ☐ A. 93 and 47
- ☐ B. 43 and 97
- ☐ C. 100 and 40
- ☐ D. 100 and 47

Q14. The boxes regroup which pair multiplies first. Which line correctly shows the associative property?

$$(2 \times 3) \times 4$$

$$2 \times (3 \times 4)$$

- ☐ A. $2 \times 3 \times 4 = 2 + 3 + 4$
- ☐ B. $(2 \times 3) \times 4 = 4 \times (3 \times 2)$
- ☐ C. $2 \times (3 + 4) = 2 \times 3 + 2 \times 4$
- ☐ D. $(2 \times 3) \times 4 = 2 \times (3 \times 4)$

Q15. Which of the following is FALSE?

- ☐ A. $5 \times 6 = 6 \times 5$
- ☐ B. $(5+6)+7 = 5+(6+7)$
- ☐ C. $5 - 6 = 6 - 5$
- ☐ D. $5 \times (6+7) = 5 \times 6 + 5 \times 7$

Q16. Simplify $15 \times 4 \times 25$ by multiplying the convenient pair first.

- ☐ A. 1500
- ☐ B. 150
- ☐ C. 60
- ☐ D. 375

Q17. Four heaps: 30, 45, 20, 55. Which pairing gives the fastest mental sum?



Pair teal with teal? Or mix to make round tens?

- ☐ A. $30+45$ then $+20$ then $+55$
- ☐ B. $(30+55)$ and $(45+20)$ only
- ☐ C. Any pairing is equally fast
- ☐ D. $(30+20)$ and $(45+55)$

Q18. Which property justifies rewriting 12×99 as $12 \times 100 - 12 \times 1$?

- ☐ A. Commutative
- ☐ B. Distributive
- ☐ C. Associative
- ☐ D. None — this move is invalid

Q19. Compute 12×99 by using $12 \times 100 - 12 \times 1$.

- ☐ A. 1188
- ☐ B. 1200
- ☐ C. 1088
- ☐ D. 99

Q20. Which property would you use to check $250 \times 4 \times 2$ quickly by multiplying 4×2 first?

- ☐ A. Distributive
- ☐ B. Associative
- ☐ C. Commutative only, not associative
- ☐ D. None, order must stay as written

Section C - Challenge

Q21. Kabir claims these two subtraction groupings are equal. Compute both sides.

$$20 - (8 - 3)$$

$$20 - 5$$

$$(20 - 8) - 3$$

$$12 - 3$$

- ☐ A. Left 15, right 9 — not equal, claim false
- ☐ B. Both sides equal 15, claim true
- ☐ C. Both sides equal 9, claim true
- ☐ D. Left 9, right 15 — not equal, claim false

Q22. Which single property, applied twice, turns $3 \times (4 + 5 + 6)$ into $(3 \times 4) + (3 \times 5) + (3 \times 6)$?

- ☐ A. Associative, applied twice
- ☐ B. Distributive, applied twice
- ☐ C. Commutative, applied twice
- ☐ D. No single property can do this

Q23. A student calculates 6×23 as $6 \times 20 + 3$, forgetting to multiply the second part by 6. What is the size of their error?

- ☐ A. They are short by 6
- ☐ B. They are short by 3
- ☐ C. No error — the answer is still correct
- ☐ D. They are short by 15

Q24. Which of these is a correct use of BOTH commutative and associative properties on $4+9+6+1$?

$$4 + 6 = 10$$

$$9 + 1 = 10$$

- ☐ A. $(4+6)+(9+1) = 10+10 = 20$
- ☐ B. $4+9+6+1 = 4 \times 9 \times 6 \times 1$
- ☐ C. $4+9+6+1 = 4-9-6-1$
- ☐ D. Only left-to-right order allowed

Q25. Anaya says the associative property alone (without commutative) would still let her rearrange $58+62+47+73$ into any pairing, including swapping 62 and 47. Is she right?

- ☐ A. Yes, it covers position swaps too
- ☐ B. No, neither property allows this
- ☐ C. No, both properties are needed here
- ☐ D. Yes, but only for four numbers

Q26. Compute $10/2$ and $2/10$. What does this show about division?

- ☐ A. $10/2 = 2/10$ always
- ☐ B. $10/2$ and $2/10$ are both undefined
- ☐ C. Division is actually commutative
- ☐ D. $10/2 = 5$ and $2/10 = 0.2$, which are not equal

Q27. A baker orders 3 trays of 24 buns and later 3 trays of 16. Which single distributive-style calculation gives the total?

3 x 24

3 x 16

Same 3 trays in each order — add 24 and 16 first?

- ☐ A. $3 \times 24 \times 16$
- ☐ B. $(3+3) \times (24+16)$
- ☐ C. $3 \times (24+16) = 3 \times 40 = 120$
- ☐ D. $3 \times 24 + 16$

Q28. Is the distributive property ever useful when multiplying two two-digit numbers, like 23×47 ?

- ☐ A. No, it only works with one two-digit number
- ☐ B. Yes — split both numbers, e.g. $23 \times 47 = 23 \times (40+7)$
- ☐ C. No, distributive only applies to single-digit numbers
- ☐ D. Yes, but only if both numbers are even

Q29. Reverse $(7 \times 9) + (7 \times 4)$ into a single multiplication. What value do you get?

- ☐ A. $7 \times (9+4) = 91$
- ☐ B. No, distribution cannot be reversed

- ☐ C. $7 \times 9 \times 4 = 252$
- ☐ D. $(7+7) \times (9+4) = 182$

Q30. Kabir's group recounts a pile by splitting it into 6 heaps instead of 4. Does changing the number of heaps affect whether their final total is trustworthy?

- ☐ A. Yes, only 4 heaps are correct
- ☐ B. No, associative guarantees any split works
- ☐ C. Only if heaps are equal in size
- ☐ D. Only if the heap count is even

Answer Key

Q1: (A) (a) $7 \times 9 = 9 \times 7$. Multiplication can be safely reordered; the other options misuse subtraction, division, or mix up operations entirely.

Q2: (D) (d) Commutative. Commutative specifically means order can be swapped — associative is about grouping instead.

Q3: (C) (c) 138. $6 \times 20 = 120$ and $6 \times 3 = 18$, then $120 + 18 = 138$. Stopping after 120 forgets to multiply the 3 by 6 as well.

Q4: (D) (d) Associative. Changing which two numbers are grouped first with brackets, while addition stays addition, is the associative property.

Q5: (B) (b) No. $5 - 3$ does not equal $3 - 5$, so subtraction cannot be swapped freely the way addition can.

Q6: (A) (a) 9. $(2+3)+4=5+4=9$ and $2+(3+4)=2+7=9$. The two groupings match, which is the associative property at work.

Q7: (C) (c) Distributive. Splitting a product across a sum, then adding the results, is exactly what the distributive property describes.

Q8: (D) (d) Multiplication and addition. It shows how multiplying by a sum relates to multiplying each part separately and then adding.

Q9: (D) (d) 120. $58+62=120$, a round number that made the next step fast. $58+62$ is not 110 or 100.

Q10: (B) (b) Associative property. Splitting a pile into heaps and adding the heap totals in any order relies on addition being associative.

Q11: (A) (a) 376. $8 \times 47 = 8 \times (40+7) = 320 + 56 = 376$. Option (d) stops after only the 8×40 part and forgets to add 8×7 .

Q12: (B) (b) $(9 \times 10) + (9 \times 2)$. Distributing the 9 across the sum inside the brackets means multiplying each term separately, then adding.

Q13: (C) (c) 100 and 40. $25+75=100$ and $18+22=40$, giving a much easier final step of $100+40=140$ than the straight left-to-right order.

Q14: (D) (d) $(2 \times 3) \times 4 = 2 \times (3 \times 4)$. Both sides equal 24 regardless of which two numbers are multiplied first. Option (c) is the distributive property, a common mix-up.

Q15: (C) (c) $5 - 6 = 6 - 5$. This is false because -1 does not equal 1 — subtraction is not commutative, unlike the other three true statements.

Q16: (A) (a) 1500. Regroup as $15 \times (4 \times 25) = 15 \times 100 = 1500$ — multiplying 4×25 first gives a clean 100, far easier than 15×4 first.

Q17: (D) (d) $(30+20)$ and $(45+55)$. This gives 50 and 100, both round numbers. The properties guarantee any pairing gives the same total, but this one is fastest.

Q18: (B) (b) Distributive. $99 = 100 - 1$, so $12 \times 99 = 12 \times (100 - 1) = 12 \times 100 - 12 \times 1$, the distributive property working with subtraction inside the brackets.

Q19: (A) (a) 1188. $12 \times 100 = 1200$ and $12 \times 1 = 12$, then $1200 - 12 = 1188$. Leaving the answer as 1200 forgets to subtract the extra 12.

Q20: (B) (b) Associative. Regrouping which pair multiplies first — $4 \times 2 = 8$, then $250 \times 8 = 2000$ — is exactly what the associative property permits.

Q21: (A) (a) Left 15, right 9 — not equal, claim false. $20 - (8 - 3) = 20 - 5 = 15$, while $(20 - 8) - 3 = 12 - 3 = 9$ — subtraction is not associative.

Q22: (B) (b) Distributive, applied twice. Distributing the 3 across the first two terms, then across the remaining term, extends the same rule beyond just two numbers inside the brackets.

Q23: (D) (d) They are short by 15. The correct value is $6 \times 20 + 6 \times 3 = 120 + 18 = 138$, but the mistaken version gives $120 + 3 = 123$, a shortfall of 15.

Q24: (A) (a) $(4+6) + (9+1) = 10 + 10 = 20$. Moving 6 next to 4 uses commutative swapping, and grouping those pairs uses associative.

Q25: (C) (c) No, both properties are needed here. Moving 47 next to 58 requires swapping it past 62 first, which is a commutative move — associative alone only regroups numbers already sitting next to each other.

Q26: (D) (d) $10/2 = 5$ and $2/10 = 0.2$, which are not equal. Swapping the order of division changes the result entirely, unlike multiplication.

Q27: (C) (c) $3 \times (24+16) = 3 \times 40 = 120$. Since both orders share the multiplier 3, 24 and 16 can be added first, then multiplied once by 3.

Q28: (B) (b) Yes — split both numbers, e.g. $23 \times 47 = 23 \times (40+7) = 23 \times 40 + 23 \times 7$. The property works regardless of how many digits are in either number.

Q29: (A) (a) $7 \times (9+4) = 91$. Factoring the common 7 back out and adding $9+4$ gives $7 \times 13 = 91$.

Q30: (B) (b) No, associative guarantees any split works. Grouping into 4 heaps, 6 heaps, or any other split never changes the sum, as long as every cap is counted exactly once.

You've got this! Keep learning and shining! - Ruchi Math Coaching